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# Dynamic Practice Guidelines for Emergency General Surgery

Committee on Acute Care Surgery, Canadian Association of General Surgeons

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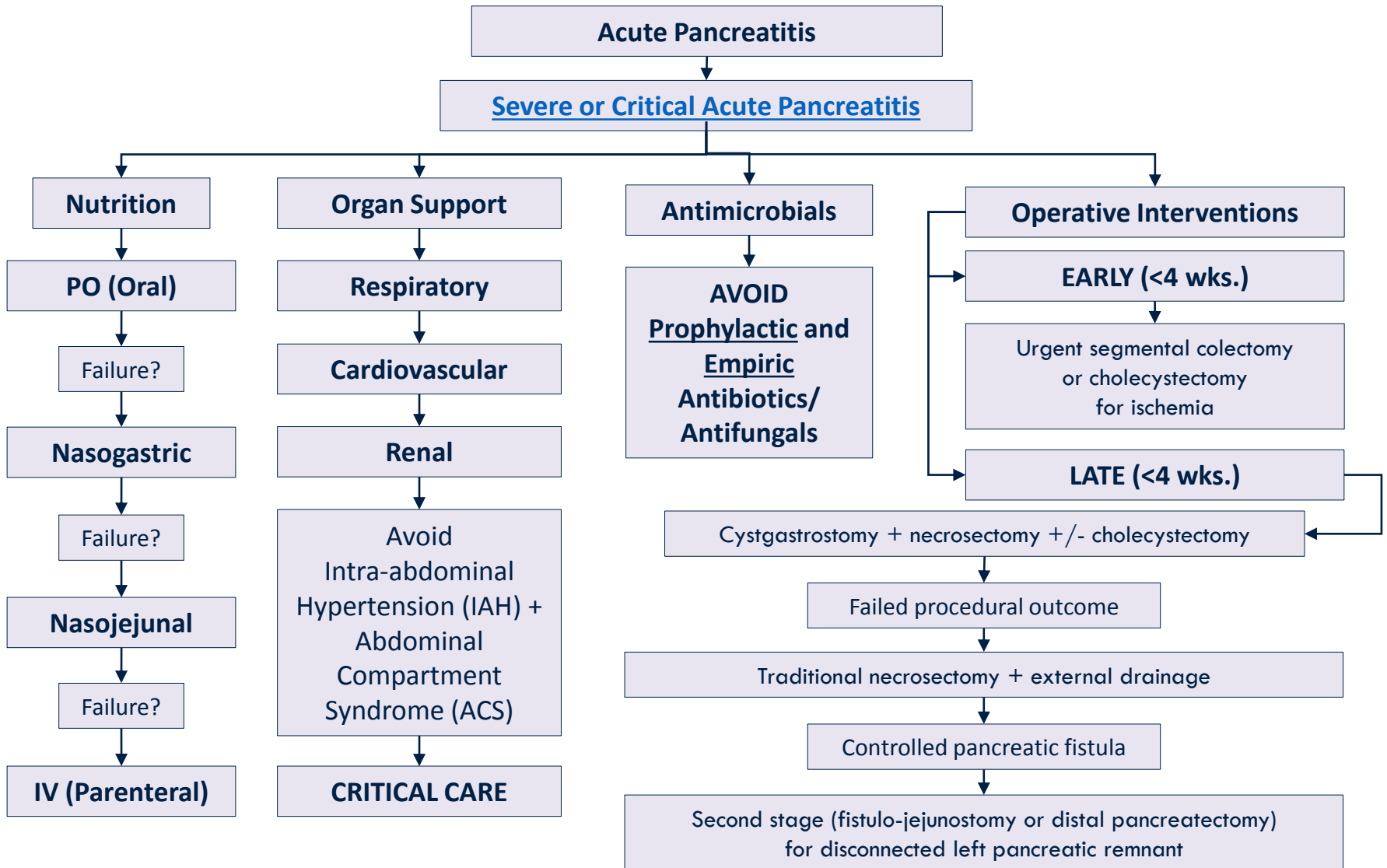
## SEVERE ACUTE PANCREATITIS

Dynamic Practice Guidelines for Emergency General Surgery

Chad G. Ball MD MSc, Jean-Michel Aubin MD

Committee on Acute Care Surgery, Canadian Association of General Surgeons

# SEVERE ACUTE PANCREATITIS



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## Epidemiology:

- Acute pancreatitis – 240,000 cases/year
  - 20% of cases are severe acute pancreatitis
  - Third most common inpatient G.I. disease
  - Necrotizing pancreatitis occurs in 15-20% of cases
    - Associated mortality = 15–20%
  - In comparison to:
  - Breast cancer – 178,480 new cases/year; Associated mortality = 22%
  - Prostate cancer – 218,890 new cases/year; Associated mortality = 12%
-

## Pancreatitis Lexicon – Atlanta Symposium – 1992

### 1993 DEFINITIONS

1. Acute pancreatitis
2. Severe AP/organ failure
3. Mild acute pancreatitis
4. Acute fluid collections
5. Pancreatic necrosis
6. Acute pseudocysts
7. Pancreatic abscess
8. Walled off pancreatic necrosis

### DISCARDED TERMS

- Phlegmon
- Infected pseudocyst
- Hemorrhagic pancreatitis
- Persistent acute pancreatitis

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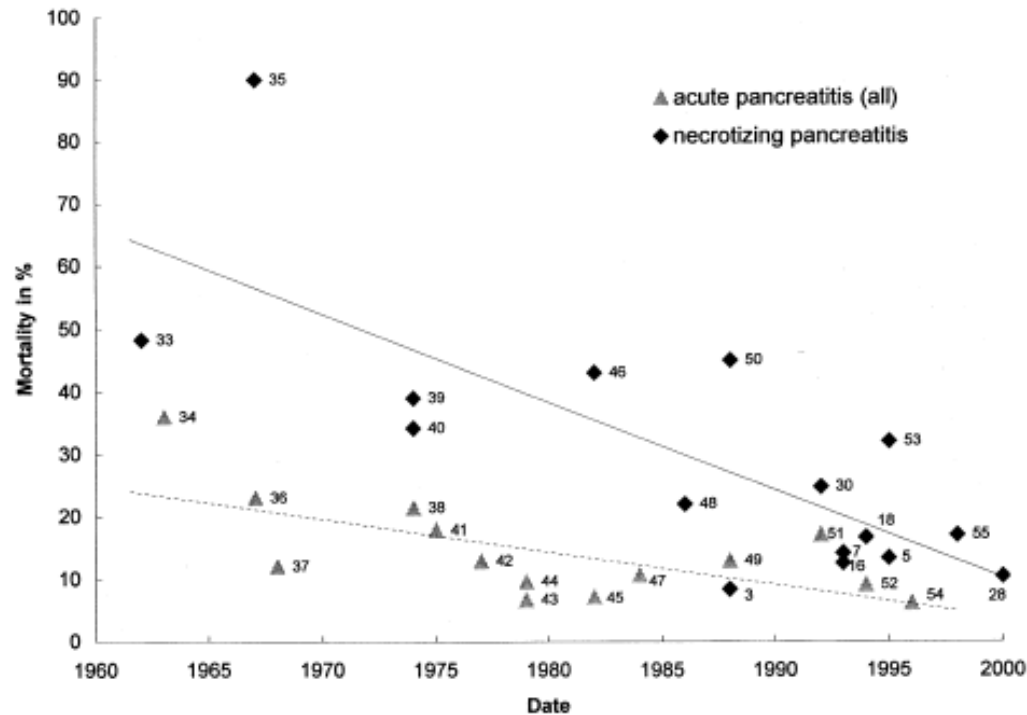
Atlanta Classification 1992	Working Group Classification 2007
<b>Acute Pancreatitis</b>	
Interstitial pancreatitis	Interstitial edematous pancreatitis (IEP)
Sterile necrosis	Necrotizing pancreatitis (pancreatic necrosis) <ul style="list-style-type: none"> <li>• Sterile or infected</li> </ul>
<b>Fluid Collections During Acute Pancreatitis</b>	
Pancreatic pseudocyst	<4 weeks after onset of pancreatitis
Pancreatic abscess	Acute peripancreatic fluid collection <ul style="list-style-type: none"> <li>• Sterile or infected</li> </ul>
Post-necrotic (peri-) pancreatic fluid collection [PNPFC]	PNPFC <ul style="list-style-type: none"> <li>• Sterile or infected</li> </ul>
	>4 weeks after onset of pancreatitis
	Pancreatic pseudocyst (rare entity as there is no necrosed tissue – only pancreatic juice) <ul style="list-style-type: none"> <li>• Sterile or infected</li> </ul>
	Walled-off pancreatic necrosis (includes both pancreatic enzyme juice and necrosis) often confused with pseudocyst) <ul style="list-style-type: none"> <li>• Sterile or infected</li> </ul>

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## Improved mortality in recent decades

- In high-volume pancreatitis centers mortality is <2%.<sup>1</sup>



<sup>1</sup>Hartwig, Maksan, Foitzik, et al, 2002 [J Gastrointest Surg](#)

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## Prognosis is affected by organ dysfunction

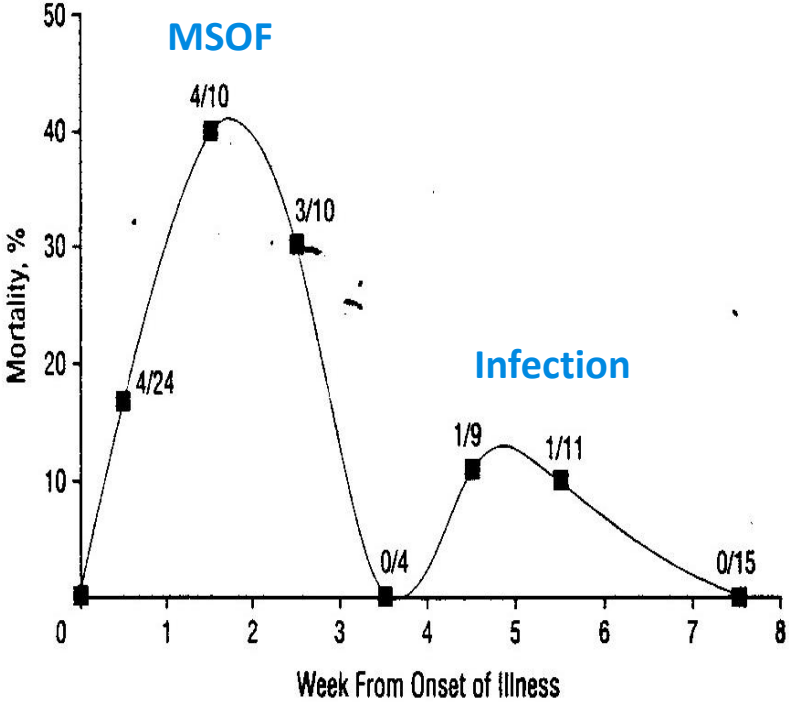
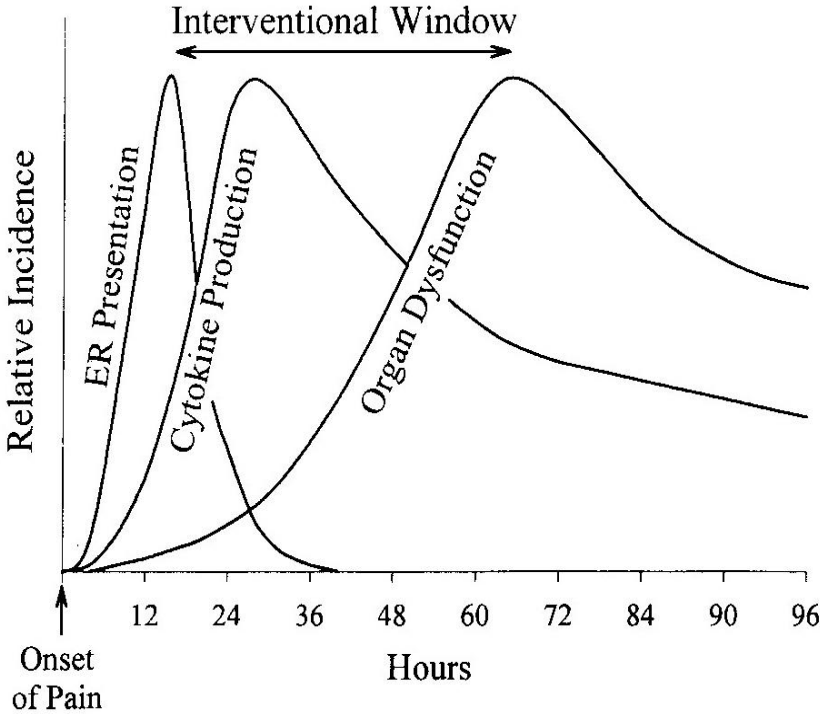


Figure (L): Norman, Franz, Fink et al, 1995 [Ann Surg](#)  
Figure (R): Ho and Frey, 1997 [Arch Surg](#)



## Classification by Severity: Local and Systemic

### Local Determinant

The local determinant of severity is necrosis of the pancreas and/or peripancreatic tissue. This is covered by the term *(peri)pancreatic necrosis*.

### Definitions

- *(Peri)pancreatic necrosis* is nonviable tissue located in the pancreas alone, or in the pancreas and peripancreatic tissues, or in peripancreatic tissues alone. It can be solid or semisolid (partially liquefied) and is without a radiologically defined wall.
- *Sterile (peri)pancreatic necrosis* is the absence of proven infection in necrosis.
- *Infected (peri)pancreatic necrosis* is defined when at least one of the following is present:
  - Gas bubbles within (peri)pancreatic necrosis on computed tomography
  - A positive culture of (peri)pancreatic necrosis obtained by image-guided fine-needle aspiration
  - A positive culture of (peri)pancreatic necrosis obtained during the first drainage and/or necrosectomy.

### Systemic Determinant

The systemic determinant of severity is a certain degree of distant organs dysfunction due to acute pancreatitis. This is covered by the term *organ failure*.

### Definitions

- *Organ failure* is defined for 3 organ systems (cardiovascular, renal, and respiratory) on the basis of the worst measurement over a 24-hour period. In patients without preexisting organ dysfunction, organ failure is defined as either a score of 2 or more in the assessed organ system using the SOFA (Sepsis-related Organ Failure Assessment) score<sup>48</sup> or when the relevant threshold is breached, as shown:
  - *Cardiovascular*: need for inotropic agent
  - *Renal*: creatinine  $\geq 171 \mu\text{mol/L}$  ( $\geq 2.0 \text{ mg/dL}$ )
  - *Respiratory*:  $\text{PaO}_2/\text{FiO}_2 \leq 300 \text{ mmHg}$  ( $\leq 40 \text{ kPa}$ ).
- *Persistent organ failure* is the evidence of organ failure in the same organ system for 48 hours or more.
- *Transient organ failure* is the evidence of organ failure in the same organ system for less than 48 hours.

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## Pancreatitis Severity

Table 1: Determinant-Based Classification of Acute Pancreatitis Severity

	Mild AP	Moderate AP	Severe AP	Critical AP
(Peri) Pancreatic Necrosis	No	Sterile	Infected	Infected
	AND	AND/OR	OR	AND
Organ Failure	No	Transient	Persistent	Persistent

*AP indicated Acute Pancreatitis*

## IMAGING/ DIAGNOSTIC WORK-UP



- The local/regional extent of necrotizing pancreatitis (and peri-pancreatitis) can only be determined via CT with intravenous contrast at  $> 7$  days following onset ([Balthazar criteria](#))
- Earlier CT imaging will underestimate the extent of disease.
- Minimal role for additional focused investigations (MRI, MRCP, EUS, US)
- ERCP is useful in patients with mild to moderate gallstone-induced pancreatitis when liver enzymes (ALP, Bilirubin) remain elevated and choledocholithiasis is believed to be persistent
- ERCP is generally unhelpful in cases of severe or critical pancreatitis; it may also be dangerous
- Additional investigations (CT) are often triggered if concern for ischemic gallbladder or colon exists

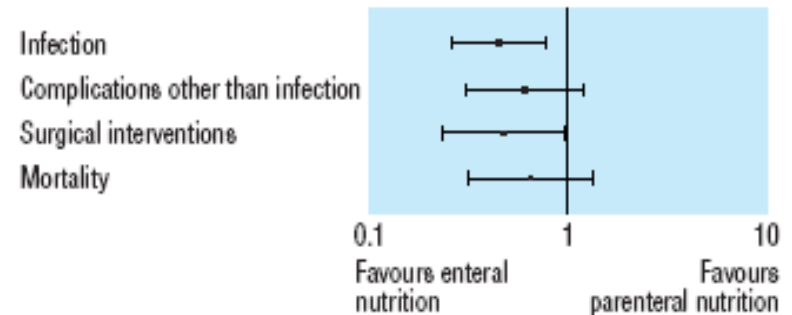
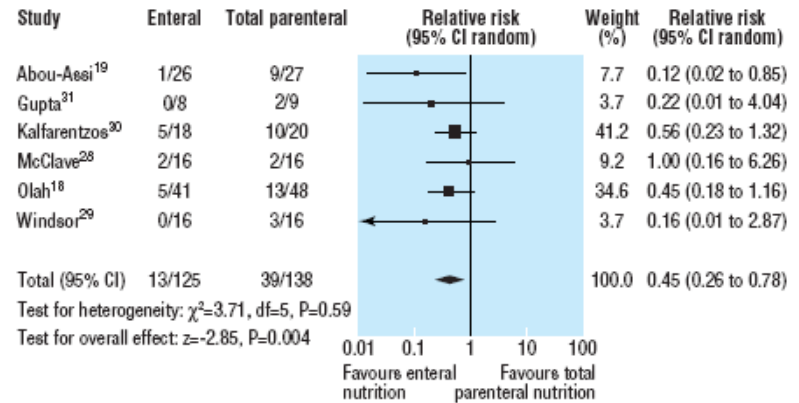


## NURTITION

Enteral nutrition associated with:

- Decreased infections
- Fewer surgical interventions
- Shorter LOS
- No effect on Mortality
- No effect on non-infectious complications

There is no reliable method to predict a patient's ability to tolerate oral intake based on imaging. A trial of PO is essential.



## Pancreatitis Bacteriology

**Table 3.** Bacteriology of Secondary Pancreatic Infection

Bacteriology	Control group (n = 34)	Antibiotic group (n = 61)	p Value
Incidence of infection	20 (59%)	40 (66%)	NS*
Single isolate	8 (24%)	23 (38%)	NS*
Multiple isolates	12 (35%)	17 (28%)	NS*
Total isolates	39	58	
Gram-negative organism	22 (56%)	15 (26%)	0.005*
<i>Pseudomonas</i>	4	1	
<i>Enterobacter</i>	7	4	
<i>Escherichia coli</i>	2	1	
<i>Klebsiella</i>	3	8	
<i>Proteus</i>	4	0	
<i>Citrobacter</i>	2	0	
<i>Serratia</i>	0	1	
Gram-positive organism	9 (23%)	30 (52%)	0.009*
<i>Enterococcus</i>	6	10	
<i>Streptococcus</i>	0	1	
<i>Staphylococcus epidermidis</i>	1	10	
<i>Staphylococcus aureus</i>	2	5	
<i>Corynebacterium</i>	0	3	
<i>Lactobacillus</i>	0	1	
Anaerobes	4 (10%)	4 (7%)	NS†
<i>Bacteroides</i>	2	3	
<i>Peptostreptococcus</i>	1	0	
<i>Clostridia</i>	1	0	
<i>Prevotella</i>	0	1	
Fungi	4 (10%)	9 (16%)	NS†
β-lactam resistance	6 (23%)	15 (26%)	NS*

\*Chi-square test with Yates correction.

†Fishers exact probability test, two-tailed.

### Key Conclusions:

“Routine broad-spectrum prophylactic antibiotic use has altered the bacteriology of secondary pancreatic infection in severe acute pancreatitis from predominantly gram-negative coliforms to predominantly gram-positive organisms without altering the rate of beta-lactam resistance or fungal superinfection.”



## ANTIBIOTIC AND ANTIFUNGAL THERAPY

- No role for prophylactic antimicrobial therapy (based on 11 RCTs)
- Initiation of empiric antimicrobial therapy should follow standard anti-sepsis guidelines and are not unique to severe/critical pancreatitis.
- Therapeutic antibiotics are reserved for the treatment of concurrent infections (pneumonia, UTI, bacteremia etc.)
- Individual patient trajectory is not defined by the presence of infection within the necrosus.
- Fine needle aspiration of the pancreas to evaluate for local infection is unhelpful and does not change patient therapy.
- Concurrent fungal infections carry a 50% higher mortality rate.

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## Surgical Outcomes

Key Conclusion: Delaying surgical intervention is safer <sup>1</sup>



Outcome Measure	1980-1985 (N=38)	1986-1990 (N=40)	1991-1997 (N=58)
Incidence of Surgery	26 (68%)	17 (43%)	19 (33%)
Surgery <72 hrs.	19 (50%)	5 (13%)	6 (10%)
Non-Operative Rate	12 (32%)	23 (56%)	39 (67%)
Mortality	15 (39%)	6 (15%)	7 (12%)

<sup>1</sup>Hartwig, Maksan, Foitzik, et al, 2002 [J Gastrointest Surg](#)

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## RCT of Early versus Late Necrosectomy



Outcome Measure	Early (<72 hrs.) [N=25]	Late (>12 days) [N=11]
Ranson's Signs	4.0 (1-7)	3.8 (3-5)
Number of Necrosectomies	3.4 (1-8)	2.8 (1-8)
Infected Necrosis	15 (60%)	7 (64%)
Mortality	14 (56%)*	3 (27%)

\* Odds Ratio: 3.39



## OPERATIVE INTERVENTION



- Waiting until >4 weeks is essential (in the absence of ischemic colon or gallbladder)
- A single stage transgastric cystgastrostomy and necrosectomy +/- cholecystectomy remains the best possible option (with multiple caveats)
- A traditional necrosectomy + closed suction drainage (and typically a delayed second stage fistula-jejunostomy or completion distal pancreatectomy) remains a more lengthy pathway, but is sometimes required
- Gentle tissue handling and nuanced operative selection/timing is critical (this separates high volume center outcomes with others)